

Effects of Nitrogen Gas Testing on Wellhead Seals

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1.0 Abstract

While wellheads on oil storage cavern access wells are exposed to oil or brine during normal operations. They are also exposed to nitrogen gas during Mechanical Integrity Tests (MITs) and other operations. This requires that the internal seals between the casing strings and the wellhead components be capable of stemming the flow of nitrogen. To ensure that the seals will function properly, nitrogen testing is recommended at installation. P-Seals and FS Seals are the two common types of seals used to isolate the top of the casing strings in the wellheads. P-Seals require pumping a sealant between the backside of the P-Seal and the seal groove in the wellhead. This sealant forces the P-Seal face against the outside surface of the casing and also against the top and bottom sides of the seal groove affecting a seal. FS Seals use an interference fit to self-energize without the use of a sealant. The FS Seals do have a profile on the back side of the seal similar to P-Seals that allows energizing with sealant if necessary. Field and in-shop testing have demonstrated that traditional P-Seals with a fabric-impregnated seal surface are not effective in containing nitrogen gas. Properly energized P-Seals without a fabric coating have shown to hold nitrogen tests without issues. FS Seals have been found effective in nitrogen tests but may or may not require energization.

Key words: P-Seal, FS Seal, Mechanical Integrity Test, nitrogen test.